



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,051	09/13/2003	Michael K. Gallagher	51473	6724
21874	7590	10/25/2006		
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			EXAMINER CHEN, KIN CHAN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 10/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/661,051	Applicant(s) GALLAGHER ET AL.	
	Examiner Kin-Chan Chen	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 10-13 and 19-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20-26 is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-13 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8, 10-13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Besling et al. (US 6,562,732; hereinafter "Besling") in view of Odian (p.18, "Principles of Polymerization", 1981, second edition) and Allen et al. (US 6,420,441; hereinafter "Allen").

In a method of manufacturing a device, Besling teaches that a sacrificial material layer may be disposed on a device substrate. An overlayer (e.g., porous dielectric) material may be disposed on the sacrificial material layer. The sacrificial material layer may be removed to form an air gap. The sacrificial material layer may comprise a polymer (abstract; col. 2, lines 34-44; Figures). Polymers typically may be linear, branched, or cross-linked polymers (p.18, "Principles of Polymerization", Odian). Besling teaches using a polymer as sacrificial material. Besling cites some examples, however, **Besling's disclosure is not limited to any type of polymer but teaches that the polymer is thermal degradable and is decomposed and removed at 400**

Art Unit: 1765

°C (col. 4, line 27). It is significant because the applicant's disclosure (page 20, last paragraph) also teaches using the same heating method and similar temperature range to remove the polymer (sacrificial material). Hence, it would have been obvious to one with ordinary skill in the art to use any known thermal degradable polymer including instantly claimed cross-linked polymer in the process of Besling because it is one of the most popular polymers used in the industry and because it is taught by Odian.

A reference is good not only for what it teaches but also for what one of ordinary skill might reasonably infer from the teachings. In re Opprecht 12 USPQ 2d 1235, 1236 (CAFC 1989); In re Bode USPQ 12; In re Lamberti 192 USPQ 278; In re Bozek 163 USPQ 545, 549 (CCPA 1969).

Since the combined prior art of Besling and Odian teaches cross-linked polymers, it would have been obvious to one with ordinary skill in the art to use commercially available (well-known) cross-linker such as multi-ethylenically unsaturated monomer. Allen (col. 8, lines 25- 58) is only relied on to show some well-known cross-linkers. Hence, it would have been obvious to one with ordinary skill in the art to incorporate cross-linker of multi-ethylenically unsaturated monomer in the process of modified Besling and Odian because it is well-known cross-linker and because it is disclosed by Allen.

The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, because it is a well-known (commercially available) feature, therefore, it is in the knowledge generally available to one of ordinary skill in the art.

The limitations of claims 1, 4, 6, 10, 11, 12, 13, and 19 have been addressed above and rejected for the same reasons, supra.

Art Unit: 1765

As to claim 2, Besling teaches using a porous dielectric material as the overlay material, making an organic polysilica (organosilanes) material obvious because it is a well-known dielectric material in device fabrication.

As to claim 5, see col. 4, lines 4-5.

As to claim 8, see Figures.

The above-cited claims differ from the prior art by specifying well-known features (such as cross-linked polymers in claims 3 and 7) to the art of device fabrication. It is the examiner's position that a person having ordinary skill in the art at the time of the claimed invention would have found it obvious to modify the prior art by adding any of same well-known features to same in order to fabricate an easily removable sacrificial material layer with a reasonable expectation of success. The examiner takes official notice of facts that applicant did not traverse the aforementioned conventionality (e.g., well-known features, common knowledge, obviousness), which have been stated in the previous office action (July 15, 2005).

3. Claims 1-8, 10-13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Babich et al. (US 6,815,329; hereinafter "Babich") in view of Odian (p.18, "Principles of Polymerization", 1981, second edition) and Allen et al. (US 6,420,441; hereinafter "Allen").

In a method of manufacturing a device, Babich teaches that a sacrificial material layer may be disposed on a device substrate. An overlayer (e.g., porous dielectric) material may be disposed on the sacrificial material layer. The sacrificial

Art Unit: 1765

material layer may be removed to form an air gap. The sacrificial material layer may comprise a polymer (col. 8 and 9; Figures). Polymers typically may be linear, branched, or cross-linked polymers (p.18, "Principles of Polymerization", Odian). Babich teaches using a polymer as sacrificial material. Babich cites some examples. **Babich's disclosure is not limited to any type of polymer but teaches that the polymer is thermal degradable and is decomposed and removed from 200 to 425°C (col. 8, line 48). It is significant because the applicant's disclosure (page 20, last paragraph) also teaches using the same heating method and similar temperature range to remove the polymer (sacrificial material).** Hence, it would have been obvious to one with ordinary skill in the art to use any known thermal degradable polymer including instantly claimed cross-linked polymer in the process of Babich because it is one of the most popular polymers used in the industry and because it is taught by Odian. Since the combined prior art of Babich and Odian teaches cross-linked polymers, it would have been obvious to one with ordinary skill in the art to use commercially available (well-known) cross-linker such as multi-ethylenically unsaturated monomer. Allen (col. 8, lines 25- 58) is only relied on to show some well-known cross-linkers. Hence, it would have been obvious to one with ordinary skill in the art to incorporate cross-linker of multi-ethylenically unsaturated monomer in the process of modified Babich and Odian because it is well-known cross-linker and because it is disclosed by Allen.

The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In

Art Unit: 1765

this case, because it is a well-known (commercially available) feature, therefore, it is in the knowledge generally available to one of ordinary skill in the art.

The limitations of claims 1, 4, 6, 10, 11, 12, 13, and 19 have been addressed above and rejected for the same reasons, *supra*.

As to claim 2, Babich teaches using a porous dielectric material as the overlay material, making an organic polysilica (organosilanes) material obvious because it is a well-known dielectric material in device fabrication (col.9, lines 41-58).

As to claim 5, see col. 8, lines 64-66.

As to claim 8, see Figures.

The above-cited claims differ from the prior art by specifying well-known features (such as cross-linked polymers in claims 3 and 7) to the art of device fabrication. It is the examiner's position that a person having ordinary skill in the art at the time of the claimed invention would have found it obvious to modify the prior art by adding any of same well-known features to same in order to fabricate an easily removable sacrificial material layer with a reasonable expectation of success. The examiner takes official notice of facts that applicant did not traverse the aforementioned conventionality (e.g., well-known features, common knowledge, obviousness), which have been stated in the previous office action (July 15, 2005).

Response to Arguments

4. Applicant's arguments filed September 18, 2006 with respect to claims 1-8, 10-13 and 19 have been fully considered but they are not persuasive.

Art Unit: 1765

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, It is in the knowledge generally available to one of ordinary skill in the art.

Applicant has argued that Babich teaches using low thermal stability material therefore there is no reason to use more thermally dimensionally stable material such as a cross-linked polymer. It is not persuasive. Babich uses the term "low thermal stability" that is simply a relative term with no basis for comparing with cross-linked polymer. As has been stated in the office action, Besling (or Babich) **disclosure is not limited to any type of polymer but teaches that the polymer is thermal degradable and is decomposed and removed from 200 to 425°C. It is significant because the applicant's disclosure (page 20, last paragraph) also teaches using the same heating method and similar temperature range to remove the polymer (sacrificial material).** Hence, it would have been obvious to one with ordinary skill in the art to use any known thermal degradable polymer including instantly claimed cross-linked polymer in the process of Besling (or Babich).

However, reference's disclosure is not limited to the exemplified (materials) / process parameters (e.g., preferred pressure range or temperature range). See In re Fracalossi, 681 F.2d 792, 794 n.1, 215 USPQ 569, 570 n.1 (CCPA 1982).

Art Unit: 1765

A reference is good not only for what it teaches but also for what one of ordinary skill might reasonably infer from the teachings. In re Opprecht 12 USPQ 2d 1235, 1236 (CAFC 1989); In re Bode USPQ 12; In re Lamberti 192 USPQ 278; In re Bozek 163 USPQ 545, 549 (CCPA 1969).

The broad interpretation of the patentee's limitation "polymer" is one which encompasses linear, branched, or cross-linked polymers. This is particularly true given that terms must be given their broadest reasonable interpretation consistent with, but not improperly limited. It would have been obvious to one with ordinary skill in the art that the disclosure of Besling (or Babich) is not limited to any type of polymer and **does not exclude cross-linked polymers.**

Johnson Worldwide Assocs., Inc. v. Zebco Corp., 175 F.3d985, 989 (Fed.Cir. 1999).

Allowable Subject Matter

5. Claims 20-26 are allowed.

6. The following is an examiner's statement of reasons for allowance:

The references of record do not teach or suggest a method of forming an air gap comprising: disposing a composition comprising one or more multi-ethylenically unsaturated monomers on a device substrate and curing the multi-ethylenically unsaturated monomers to form a cross-linked polymeric sacrificial material layer on the device substrate. A person of ordinary skill in the art would not have been motivated to apply recited process steps to form the sacrificial material because applying multi-ethylenically unsaturated monomers on a device substrate and curing would use device substrate as template which requires interaction between device surface and

Art Unit: 1765

monomers, therefore, reaction kinetics and morphology are dramatically different from applying polymer as disclosed in the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

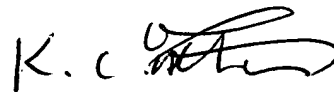
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's

Art Unit: 1765

supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

October 20, 2006



Kin-Chan Chen
Primary Examiner
Art Unit 1765